Several methods have been proposed to perform power and sample size calculations for a microarray study that will use FDR-type measures of significance in the final analysis. **[37, 38]** However, most of hese methods are designed only for two-group designs, such as studies that compare tumor expression to normal expression. Pounds and Cheng (2005) **[39]** describe a general method to perform power and sample-size calculations for tudies that will use the FDR to determine significance in the final analysis. For $i = 1, \ldots, m$, their method assumes hat cumulative distribution function of $P_i$, $G_i(\cdot; \delta_i, n)$ can be computed given the sample size $n$ and an effect size $i$. Their method uses the *average power* (AP) as a measure of statistical power. The average power is defined as the arithmetic average of the powers of the tests with a true alternative. Under model (1), the average power is simply $AP(\alpha) := H_m(\alpha; \Delta, n)$.

The sample size determination procedure uses the *anticipated false discovery rate* (aFDR), $aFDR(\alpha, \Delta, n) := \hat{E}(\hat{\pi}_0; \Delta, n)\alpha / F_m(\alpha; \Delta, n)$ to perform its calculations. The ensemble P value cdf $F_m(\cdot; \Delta, n)$ is either postulated or estimated from preliminary data. The method is designed to determine the sample size necessary to achieve an average power of $\gamma$ while keeping the aFDR below $\tau$. The values of $\gamma$ and $\tau$ must be chosen by the user. The method proceeds iteratively. With an initial sample size $n_0$ and a specified value or estimate for $\Delta$, the procedure first finds $\alpha^*$ such than $AP(\alpha^*) = \gamma$. Then, it computes $aFDR(\alpha^*)$. If $aFDR(\alpha^*) \leq \tau$ , then the procedure reports that $n_0$ is an adequate sample size to achieve average power $\gamma$ while keeping the aFDR below $\tau$ . Otherwise, it increments $n$ and repeats the calculations. The process is iterated until a maximum sample size is reached or the conditions for the aFDR and AP are satisfied. Pounds and Cheng (2005) **[39]** also describe a method to estimate necessary parameters from pilot data. They observed that the parameter-estimation and sample-size calculation method performed well in traditional simulation studies and in resampling-based simulation studies performed using real data.